DEPARTMENT OF
ECOLOGY
State of Washington

Technical Support Document for WestRock CP, LLC WestRock Tacoma PSD 06-02, Amendment 2

Prepared by

Air Quality Program
Washington Department of Ecology
Olympia, Washington

Preliminary Determination October 2021

Table of Contents

List of Tables

1. Executive Summary

WestRock Company operates an integrated pulp and paper mill (WestRock Tacoma) on about 60 acres adjacent to the mouth of the Puyallup River on Commencement Bay in Tacoma, Washington. Its products include market pulp; natural and bleached Kraft paper used for linerboard, bags, sacks, and similar food and industrial grade packaging; and other paper products.

WestRock asked to change the particulate matter (PM) compliance requirement in its Prevention of Significant Deterioration (PSD) Permit. WestRock proposes to revise the particulate matter emission testing:

- Frequency from quarterly to annually.
- Duration from one (1) run test to three (3) run tests.

After reviewing WestRock's request, Ecology proposes to approve this request. This technical support document shows Ecology's analysis supporting our decision and more detailed explanation of the revisions.

2. PSD in Washington

PSD permitting requirements in Washington are established in Washington Administrative Code (WAC) 173-400-700 through 750. Washington implements its PSD program as a State Implementation Plan (SIP)-approved program. This SIP-approved program became effective May 29, 2015.[1]

The objective of the PSD program is to prevent significant adverse environmental impact from emissions into the atmosphere by a proposed new major source, or major modification to an existing major source. The program limits degradation of air quality to that which is not considered "significant." PSD rules require the use of best available control technology (BACT) for certain new or modified emission units, which is the most effective air pollution control equipment and procedures that are determined to be available after considering environmental, economic, and energy factors.

PSD rules are designed to keep an area with "good" air in compliance with the National Ambient Air Quality Standards (NAAQS). The distinctive requirements of PSD are BACT, air quality analysis (allowable increments and comparison with the NAAQS), and analysis of impacts of the project on visibility, vegetation, and soils.

3. Project and Site Description

A. Project description

WestRock has requested an amendment to the PSD 06-02, Amendment 1 to revise the PM testing requirements for the No. 7 Power Boiler.

[1] 80 FR 23721, April 29, 2015.

The existing permit condition requires the source to test for PM_{10} on monthly basis. The frequency can be reduced to quarterly if six consecutive months' test results are less than 75 percent of the PM limit. The permit condition allows for one 1-hour (hr) test in lieu of three 1-hr tests.

WestRock has requested to revise the testing frequency to once per year, and to perform a 3-run test using EPA Methods 1 through 5.

B. Site description

WestRock operates the Tacoma Mill (WestRock Tacoma) at 801 Portland Avenue East, Tacoma, WA 98421. WestRock Tacoma is an integrated pulp and paper mill operates under standard industrial classification (SIC) code 26, pulping and paper making. The facility is one of the 28-named source categories that have a 100 tons/year threshold.

Its products include market pulp; natural and bleached Kraft paper used for linerboard, bags, sacks, and similar food and industrial grade packaging; and other paper products. Its fiber sources consist of softwood and hardwood chips, as well as recyclable materials. The mill also produces electricity from the cogeneration steam turbine.

The facility is located within a Class II area that is currently designated in attainment for all national and state air quality standards. The distances to nearest Class I areas are shown in Table 1.

Table 1: Distances to Nearest Class I Areas

Class I Area	Distance (km)
Alpine Lakes Wilderness Area	64
Glacier Peak Wilderness Area	118
Goat Rocks Wilderness Area	91
Mt. Adams Wilderness Area	121
Mt. Hood Wilderness Area	203
Mt. Jefferson Wilderness Area	267
Mt. Rainier National Park	47
North Cascades National Park	159
Olympic National Park	67
Pasayten Wilderness Park	189
Columbia River Gorge National Area1	167
Mt. Baker Wilderness Area[1]	151

[1] The Columbia River Gorge National Scenic Area and the Mt. Baker Wilderness Area are not designated Class I areas. However, at the FLMs and Ecology's request, these areas are usually included in Air Quality Related Value assessments.

C. PSD permit history

PSD 06-02 issued May 22, 2007

The permittee at the time was Simpson Tacoma Kraft Company. The approval allowed the permittee to install a steam turbine generator driven by steam produced from No. 4 Recovery Boiler and No. 7 Power Boiler. The project was described as "steam turbine generator" project.

The permit authorized the installation and operation of the following:

- A steam turbine and electrical generator rated at up to 60 MW
- Power distribution and overload protection equipment
- A building to house the turbine/generator
- Upgrades to the demineralizer system to produce the higher-quality boiler feedwater required for power generation
- A cooling tower to condense the turbine discharge steam that is not used in the process
- Boiler improvements to produce the higher pressure and temperature steam required for power generation. These improvements included adding tube area to No. 7 Power Boiler's superheater section, upgrading the pressure rating of No. 4 Recovery Boiler's generation bank, new pressure safety valves, and piping changes to handle higher pressure steam.
- Upgrades to No.7 Power Boiler to increase its Maximum Continuous Rated (MCR) steaming capacity from 300,000 lb/hr to 340,000 lb/hr. These included larger forced- and induced-draft fan motors, wood fuel feed system improvements, and possibly improvements to the ash handling, electrostatic precipitator, and other ancillary systems.

For this project, the nitrogen oxides (NO_X), carbon monoxide (CO), and particulates less than 10 microns in diameter (PM_{10}) have net emissions increases greater than their PSD significant emission rate and are subject to regulation under PSD.

Potential regulated pollutants for the project are shown in Table 2. They are:
NO_X, CO, sulfur dioxide (SO_2), volatile organic compounds (VOCs), PM_{10}, and PM.

Table 2: Summary of Baseline and Projected Actual Emissions

	NO_X	CO	SO_2	PM_{10}[1]	VOC
Short-Term Emission Rates (lb/hr)					
Existing (annual average)[2]	65.9	81.5	84.1	12.5	5.1
Future (at MCR)[3]	119.1	208.4	87.5	22.6	12.0
Increase in hourly emissions	53.2	126.9	3.4	10.0	6.8
Annual Emission Rates (tons)					
Baseline Years	2000-2001	2004-2005	2003-2004	1996-1997	2001-2002
Baseline emissions	289	357	368	55	23
Future potential emissions	522	913	383	99	52
Difference	233	556	15	44	30
PSD Applicability Trigger	40	100	40	15	40
PSD?	**Yes**	**Yes**	No	**Yes**	No

[1] All PM/PM_{10} is considered PM_{10} for this permitting action.
[2] Estimated by dividing baseline annual emissions by 355 days of 24-hour operation.
[3] Assumes 365 days per year of operation.
[Note: PM_{10} potential emissions include emissions from the cooling tower.]

Best Available Control Technology (BACT) determinations are shown in Table 3. The project did not trigger any PSD permitting requirements for No. 4 Recovery Boiler.

Table 3: BACT Determinations

Pollutant	#7 Power Boiler BACT Limit and Control Technology
Nitrogen oxides (NO_X)	0.20 lb/MMBtu based on using proper combustion controls and overfire air
Carbon monoxide (CO)	0.35 lb/MMBtu based on using proper combustion controls and overfire air
Particulate matter and particulate matter less than 10 microns (PM_{10})	0.020 lb/MMBtu based on using electrostatic precipitator
Pollutant	**Cooling Tower BACT Limit and Control Technology**
PM/PM_{10}	Installation of a demister guaranteed to have a drift loss of less than 0.0005% of the recirculating water flow rate

Table 4 shows NO_X and CO impacts are below their respective NAAQS and significant impact levels (SILs).

Table 4: Maximum Predicted Criteria Pollutant Concentrations (µg/m^3)

Compound	Avg. Period	Max. Concentration	SIL[1]	PSD Monitoring De Minimis
NO_2[2]	Annual	1.0	1	14
CO	1-hour	195	2000	---
CO	8-hour	97	500	575
PM_{10} (PB 7 only)	24-hour	4.8	5	10
PM_{10} (PB 7 only)	Annual	0.24	1	---
PM_{10} (PB 7 & cooling tower)	24-hour	16[3]	5	10
PM_{10} (PB 7 & cooling tower)	Annual	0.39	1	---

[1] SIL = Significant Impact Level, per WAC 173-400-113(3)
[2] NO_2 was assumed to be 75% of the emitted NO_X based on Section 6.2.3. of the EPA's Guideline on Air Quality Models (codified as Appendix W to 40 CFR Part 51).
[3] Ecology determined that this PM_{10} SIL exceedance due to cooling tower drift did not trigger cumulative impact modeling requirements both because it was over water and because it could be an artifact of how the model predicts PM_{10} drift as opposed to large water droplet drift from the cooling tower.

In the 2007 PSD permitting, Ecology concluded that the allowable emissions would not cause a significant visibility impact in:

- The surrounding Class I areas: The highest modeled impacts were 3.9 percent and 3.0 percent degradation in the Alpine Lakes Wilderness Area and Olympic National Park, respectively. Federal land manager guidance considers this to be below the "concern" threshold.
- Nearby Class II wilderness and scenic areas: The highest modeled impact was 1.4 percent degradation in the Mt. Baker Wilderness Area. Federal land manager guidance considers this to be below the "concern" threshold.

The highest modeled deposition in the surrounding Class I areas is 0.0034 kilograms nitrogen and 0.0017 kilograms sulfur per hectare per year in the Alpine Lakes Wilderness Area. The nitrogen deposition level is 68 percent of the "concern" threshold in federal land manager guidance. The sulfur deposition level is 34 percent of the federal land manager "concern" threshold.

PSD 06-02, Amendment 1 issued March 22, 2016

The amendment revised the original permit's NO_X BACT limit from 0.20 to 0.30 lb/MMBtu.

The original NO_X BACT limit was based on the expected performance of a new overfire air (OFA) system installed under a minor New Source Review permit issued shortly before the original PSD permit, but not well tested at that time. The new system did not reduce NO_X emissions in the manner predicted by the vendor, resulting in this permit modification request. Additional information provided by the Tacoma Mill to EPA and Ecology in 2014 confirmed that the original permit's NO_X limit was determined inappropriately using erroneous information.

For this permitting action, the total NO_X increase for the project (difference between the original project's baseline actual emissions and the new proposed 0.30 lb/MMBtu limit, not just the increase for this amendment) was modeled. The project net increase was 493 tons per year (tpy), based on baseline emission of 289 tpy (2000 to 2001 baseline years) and future potential of 782 tpy (based on 0.30 lb/MMBtu). The maximum predicted concentration was 2.9 $\mu g/m^3 > 1$ $\mu g/m^3$ (annual averaging period SIL). Therefore, a full impact analysis was conducted.

Allowable emissions were used for the NAAQS analysis and the 2-year average actual (2007 and 2008) and 1988 baseline emissions were used for the PSD Increment analysis.

Results of the NAAQS analysis are provided in Table 5.

Table 5: NO_2 NAAQS Analysis Results

Avg. Period	Year of Maximum	UTM East (km)	UTM North (km)	Modeled Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Annual	2002	543,422.8	5,234,842	43.3	28	71.3	100*
• Annual arithmetic mean.							

Results of the PSD increment analysis for NO_2 are provided in Table 6.

Table 6: NO_2 PSD Increment Analysis Results

Year of Maximum	UTM East (km)	UTM North (km)	Modeled Concentration ($\mu g/m^3$)	Background ($\mu g/m^3$)
2002	543,422.8	5,234,842	22.9	25*
• Annual arithmetic mean.				

D. Affected emission unit(s)

The emission unit(s) affected by this permit are listed in Table 7.

Table 7: Affected Emission Unit(s)

Emission Unit Description	Design Capacity
No. 7 power boiler	• Maximum Continuous Rated (MCR) steaming capacity 340,000 lb/hr • 595 MMBtu/hr
Cooling tower	• 25,000 gal/min circulation rate

The construction of the No. 7 Power Boiler began in early 1990 and the operations began in May 1991. Under the approval of PSD No. 06-02, WestRock installed the OFA system in the furnace to improve the distribution of combustion air, and allow the use of more wood and less fossil fuel. OFA primarily is to reduce CO emissions by improving combustion. The post project maximum design heat input for the boiler is estimated to be 595 MMBtu/hr.

No. 7 Power Boiler primarily burns hog fuel (woody biomass), construction and demolition (C&D) material (clean wood), wood yard chip fines, dewatered pulp and paper mill wastewater treatment residuals, and clean old corrugated container (OCC) residuals. The boiler has not burned fuel oil since 2009. WestRock is currently supplementing biomass with natural gas, but may resume supplemental fuel oil burning as future market warrants.

The boiler is equipped with two electrostatic precipitators (ESPs) in parallel. The flue gas from each ESP is routed to a wet scrubber. WestRock installed the wet scrubber during 2016 to meet the boiler Maximum Achievable Control Technology requirements.

4. Permit Conditions Revision Discussion

WestRock proposes to revise the existing permit conditions to allow testing for PM_{10} emissions once per year for the No. 7 Power Boiler at the Tacoma Mill. This revision also clarifies that the test shall be at least three runs and at least one hour for each run.

The existing permit condition requires the source to test for PM_{10} on a monthly basis and can be reduced to quarterly if six consecutive monthly test results are less than 75 percent of the PM_{10} emission limit. The permit conditions allow for one 1-hour test in lieu of three 1-hour tests.

This permit revision is not an administrative permit revision as described in WAC 173-400-750 (3) and is subject to public involvement requirements.

Ecology also reorganized and streamlined the permit conditions, which included removing obsolete language. The more significant changes are discussed below.

E. PM_{10} test frequency

No. 7 Power Boiler is subject to a PM_{10} (filterable) emission limit of 0.020 lb/MMBtu on a calendar day basis, which was considered equivalent to 0.01 gr/dscf at seven percent O_2 in the original BACT analysis.

Ecology finds that it is appropriate to revise the sampling runs for the PM_{10} test from one run to three runs so that the PM_{10} test conducted obtains the minimal statistical data required for a compliance demonstration. Since the revision will result in longer test durations, it is reasonable to require the test conducted at least once per year instead of quarterly.

This review has noted that Condition 12.2 of PSD 06-02, Amendment 1 specified that compliance with the PM limit shall be based on the average of the previous three PM tests conducted with each test separated by three months apart. In a sense, the compliance method remain unchanged. However, it is more desirable to obtain a representative 3-run test result in a day considering the emission limit is on a calendar day basis. Under the current condition, if a high PM concentration was detected during one of the 1-hr test runs, the compliance status of the unit will remain undetermined for months before necessary minimum data was obtained for the determination.

Ecology also reviewed and considered the No. 7 Power Boiler's historical PM test results to determine if the proposed annual test frequency is sufficient for compliance monitoring. Based on the test results provided, Ecology finds that there is sufficient compliance margin and believes that annual testing frequency is appropriate.

WestRock Tacoma provided PM_{10} test results from 2018–2020 shown in Table 8.

Table 8: WestRock Tacoma 2018–2020 PM_{10} Test Results

Test Date	Filterable PM (lb/MMBtu)	Steaming Rate (Klb/hr)	Firing Rate (MMBtu/hr)	Biomass Firing Rate (MMBtu/hr)	Natural Gas Firing (MMBtu/hr)
3/5/2020	0.0036	294	462	454	8
6/23/2020	0.0019	305	495	459	35
8/27/2020	0.0038	321	478	435	43
12/17/2020	0.0055	319	521	477	45
3/5/2019	0.0033	310	489	489	0
6/4/2019	0.0148	301	690	463	27
5/15/2019	0.0035	301	437	416	21
11/22/2019	0.0111	290	746	466	0
3/9/2018	0.0040	272	434	400	34
5/22/2018	0.0096	313	451	451	0
8/21/2018	0.0037	306	429	401	28
11/14/2018	0.0067	305	434	434	0

To demonstrate compliance with PM limit, WestRock has been using the "F factor" method, along with the PM and O_2 concentration obtained from the performance test. An F factor is the ratio of the gas volume of the products of combustion to the heat content of the fuel.

The dry F factor (Fd) includes all components of combustion less water. Value of Fd (expressed in dscf/MMBtu) may be determined on a case-by-case basis using the ultimate analysis and gross calorific value of the fuel. WestRock uses internal F factor of 9,670 dscf/MMBtu for biomass, which they obtained from their internal stack testing. The total heat input rate during the tests has been estimated by using the combined biomass and natural gas F Factor values.

The default Fd factors from Appendix F of 40 CFR 75 for bark is 9,600 dscf/MMBtu and wood residue is 9,240 dscf/MMBtu. WestRock's internal F factor is relatively comparable to the default F factor from 40 CFR 75. Since No. 7 Power Boiler could use a variety of fuels and from different fuel sources, the F factor should be re-evaluated if there is a significant changes to fuels mix to ensure representativeness of the F factor for the No. 7 Power Boiler.

A. Obsolete conditions

The following conditions are obsolete and have been removed from the permit:

- Condition No. 5 – Notification requirements for initial startup
- Condition No. 6 – Initial compliance demonstration language for NO_X
- Condition No. 7 – Initial compliance demonstration language for CO
- Condition No. 8 – Initial compliance demonstration language for PM/PM_{10}
- Condition No. 9 – Initial compliance demonstration language for the cooling tower

B. Other changes

- For consistency in Air Quality Program permit writing, the word "shall" in the permit has changed to "must."
- Streamlined CO and NO_X Continuous Emission Monitoring (CEM) language for better consistency.
- Language in Condition 9.6 has been added to clarify that the most recent compliance test result must be used to determine compliance with the PM_{10} emission rate 12-month rolling basis.
- Some language in Condition No. 15 of PSD 06-02, Amendment 1 appears to be a compliance determination method, but was categorized as reporting requirements. This language has been incorporated to make part of Conditions 8 and 9 of this revision to clarify that these are compliance determination language.

- Since the PM testing frequency will be reduced, new language has been added in Condition 9 to require the PM test conducted within November 1–April 30 to obtain a conservative test condition. During those months, the fuel used in the hog fuel boiler tend to be wetter, which could impact combustion and result in higher PM emissions.

5. State Environmental Policy Act (SEPA)

City of Tacoma originally issued a State Environmental Policy Act (SEPA) Mitigated Determination of Nonsignificance (MDNS) on April 12, 2007 for the project. The proposal does not change the scope that was covered under the original SEPA determination. The revised permit conditions also is not expected to have additional environmental impact.

Ecology will incorporate the original SEPA MDNS issued by reference for this action.

6. Environmental Justice (EJ) Review

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Ecology conducts an EJ review to ensure no group of people bear a disproportionate share of the negative environmental consequences as the result of the permitting action.

Ecology finds that the EJ review is not needed because there is no emission increase as the consequences of this permitting action.

7. Public Involvement

This PSD permitting action was subject to a minimum 30-day public comment period under WAC 173-400-740. Ecology posts the public notice on Ecology's web site and accepts public comment from [Date].

8. Agency Contact

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Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
BACT	Best Available Control Technology
CFR	Code of Federal Regulations
CO	carbon monoxide
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
FLM	Federal Land Manager
FR	Federal Register
NAAQS	National Ambient Air Quality Standards
NO_X	nitrogen oxides
PM	particulate matter
PM_{10}	particulate matter less than 10 micrometers in diameter
PSD	Prevention of Significant Deterioration
SEPA	State Environmental Policy Act
SIL	significant impact level
SO_2	sulfur dioxide
tpy	tons per year
VOC	volatile organic compound
WAC	Washington Administrative Code
WestRock Tacoma	WestRock Tacoma Mill